# APPENDIX A:
# Summary of
# Water Supply Alternatives Considered

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| WATER SUPPLY ALTERNATIVE | WATER AMOUNT AND TIMING | COST AND TIMEFRAME | ENGINEERING FEASIBILITY | REGULATORY REQUIREMENTS | ENVIRONMENTAL IMPACTS AND BENEFITS |
|---|---|---|---|---|---|
| WATER CONSERVATION ALTERNATIVES | | | | | |
| WC-1: District-wide Agricultural Water Conservation | 2,300 acre-feet in an average year; 467-543 ac-ft firm yield. | $300,000, minimal annual costs. Most measures implemented within one year. | Measures can reduce spills by installing various devices and structures to provide better district-wide flow control. | No regulatory requirements to implement these measures. Transfer and lease conserved water to instream flow through the State Water Trust | Provides 1.5% to 9% of target for instream flows. |
| WC-2: OID Totally Pressurized Delivery System | 2,400 acre-feet in an average year; 467-543 ac-ft firm yield. | $3.7 M facilities; $65k annual costs. One year to design/construct; 18+ months environmental compliance. | Pressurized main canal can deliver water on demand without need to spill. | No regulatory requirements to implement these measures. Transfer and lease conserved water to instream flow through the State Water Trust | Provides 1.5% to 9% of target for instream flows. |
| WC-3: Non-agricultural Water Conservation Purchase and Transfer | Insufficient potential identified to pursue. | | | | |
| WATER EXCHANGE ALTERNATIVES | | | | | |
| WE-1: City of Okanogan Reclaimed Water Exchange | 450,000 gpd (0.7 cfs) | The City does not treat to the standard required for water reuse; the cost of upgrades would be infeasible (ca. $1.5 M) | Small package treatment plants are available “off the shelf” | City’s current treatment does not meet Washington State standards for water reuse | |
| WE-2: City of Okanogan Watercress Springs Exchange | 300 gpm (0.67 cfs), 484 acre-feet | $2.2 M to $2.6 M facilities; about $40,000 annual O&M; negligible pumping cost. Time-frame to complete is 1-3 years. | Three feasible scenarios identified. The best engineering solution would be a new reservoir in the City. | Transfer City springs water claim to a City well. Convey springs water to avoid being taken by a senior water right claimant. | Provides 2-5% of minimum passage flows; offsets channel loss; supports riparian vegetation. Opportunity to develop springs fish habitat. Insufficient data to evaluate source impacts. |

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| WATER EXCHANGE ALTERNATIVES (cont'd) | | | | | |
| WE-3: Okanogan River Water Exchange | Up to the full natural flow of Salmon Creek. Timing can be shaped by OID's dams/reservoirs. Firm yield up to natural firm yield of watershed (ca. 7,234 ac-ft/yr for 80 cfs alternative and 4,374 ac-ft/yr for 20 cfs alternative) | $1.8 M for 20 cfs pipeline; $4.7 M for 80 cfs pipeline, $7.0 M for 80 cfs pipeline/all pressurized system. Two to three years to complete. | Alternatives include 80 cfs exchange, serving full irrigation demand, and 20 cfs, providing fish flows only. Two alternative pipeline routes; the preferred route diverts upstream of the confluence of Salmon Creek-Okanogan River | Water right change as to place and purpose of use and point of diversion. New water rights application for additional Okanogan River diversions and for conversion of emergency water rights. | Provides up to 100% of target for instream flows. Returns Salmon Creek flows to natural levels. Storage at the top of the system can shape flows to meet flow needs for all life stages. Greatest opportunity for stream restoration and salmonid recovery. Improves temperature conditions in the Okanogan River. |
| WE-4: Salmon Creek/ Watercress Springs Water Right Claimants | 0.76 cfs and 144 acre-feet | | Service would be feasible, however diverters have decided that they would rather replace their existing diversion. | Requires agreement to sell, exchange or donate with claimants and water right change/transfer as to purpose, place of use and point of diversion. | Provides 2-5% of minimum passage flows; offsets channel loss; supports riparian vegetation. |
| WATER MANAGEMENT ALTERNATIVES | | | | | |
| WMan-1: Duck Lake Water Management | No new water is available. Water rights are supplemental. Potential to reduce spill to Duck Lake is captured under conservation alternatives | No alternatives requiring funds are identified. Duck Lake operations are scheduled as part of overall OID water management, at the cost of pumping. | Existing facilities are in place. No new facilities are identified under this alternative. | Water rights are supplemental to other OID sources. No changes are proposed. | No environmental impacts or benefits identified, as substantial changes in operations are not proposed. |
| WMan-2: OID Diversion 5 Re-regulation | 500 acre-feet/year firm yield (conserved spill) | $100,000 to construct, minimal annual cost. Can be implemented within 12-18 months | A 100 acre-foot re-regulating reservoir can reduce spills. | Dam, water storage and construction permits, depending on size of reservoir. | Provides 1.5% to 9% of target for instream flows. |

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| WATER MANAGEMENT ALTERNATIVES (cont'd) | | | | | |
| WMan-3: On-farm Water Management | Ranges from 63 acre-feet in a dry year to over 4,000 acre-feet in a wet year. Firm yield 1,023-1,153 acre-feet/year. | $500,000 to implement, no annual cost | Standard irrigation management practices can be improved through education, demonstration, and incentives. | No regulatory permits required. Conserved water can be protected instream through conveyance to the State Water Trust. | Provides 15% to 33% of target for instream flows. |
| WATER MARKETING ALTERNATIVES | | | | | |
| WMar-1: OID Member Irrigators Water Bank | Amount of water made available depends upon price and annual decisions by irrigators. Up to 1,585 acre-feet of water initially assumed available under annual or longer-term leases. | $100 to $600/acre-foot; available immediately | No engineering is required. | OID Board resolution to establish water bank. Water transfer needed as to place, purpose, and point of diversion. Water leased to instream flow may be required to be conveyed via the State Water Trust. | Provides 18% to 50% of target for instream flows. |
| WMar-2: Purchase Groundwater Stored at Duck Lake | 2,200 acre-feet (may be reduced by water system improvements) | $700/acre-foot | Could be distributed using existing system. | Artificially stored groundwater may be taken at existing pumps under terms specified in Order DE 85-20. | Reduce availability of water for residential use in a closed basin. |
| WMar-3: Purvey to City of Omak | No water to Salmon Creek. | The objective of this alternative is to obtain Omak participation in financing selected alternatives. | | Omak is consummating an agreement with OID to purchase artificially stored groundwater at Duck Lake. Thus, it is unlikely that the City would participate in other alternatives. | |

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| WATER RIGHTS ALTERNATIVES | | | | | |
| WR-1: Duck Lake Water Association | No water available. | | | | |
| WR-2: North Fork Salmon Creek Water Right Owners | 1.33 cfs (963 acre-feet) (39 water rights and claims) (probably captured as return flows or unused water rights at Conconully Reservoir) | $1000-$2000/acre-foot, plus transaction costs. Minimum 18 months. | No engineering required. | Acquire and transfer up to 39 water rights and claims to instream flow, convey to State Water Trust. | |
| WR-3: Okanogan County | Total water rights owned by County sum to 246.45 acre-feet and 0.33 cfs | | | Considering small size of water rights and uncertainty of County as to their availability, this alternative was not pursued further. | |
| WATER STORAGE ALTERNATIVES | | | | | |
| WS-1: Aquifer Storage and Recovery | Actual extent of storage potential is unknown. This alternative assumes 5,100 acre-feet/year storage and 759-833 acre-feet/year firm yield. | A very rough planning level cost estimate is $2.5 O&M for implementation and $40k for O&M. This alternative could require 2-4 years to develop. | Groundwater storage may be feasible down-stream of Watercress Springs. Conceptual design assumes a 16-well injection system with associated intake, distribution pipe, pumps, controls and return pipe. | No special permit requirements in Washington for ASR. Advisable to amend Order DE 85-20 to protect the stored water. | Provides 9% to 19% of target for instream flows. |
| WS-2: Brown Lake | 10,000 acre-feet of new storage; 1,316-1,349 acre-feet per year firm yield. | $7.3 M to $8.3 M for dam engineering and construction, land, pipelines. Minimal annual O&M. Three to five years to complete implementation. | Two dams would be required, together with diversion structures and pipelines. Could return flows to Salmon Creek or deliver to OID. | Change in water right point of diversion, full dam/reservoir permitting. Duck Lake level minima/maxima may constrain operations. | Provides 18% to 40% of target for instream flows. Dam construction has few impacts. Conveyance of water may provide incidental winter flows, or could reduce flows in middle reach of Salmon Creek. |
| WS-3: CCT Reservation Site | | Distance from CCT reservation is economically infeasible. | | | |

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| WATER STORAGE ALTERNATIVES (cont'd) | | | | | |
| WS-4: Green Lake | Perhaps 5,000 acre-feet of storage | | | Diversion, storage and amended dam permits | Alternative eliminated for impacts to scenic resource, wetlands, and recreation. |
| WS-5: Inter-basin transfer<br>Scotch Creek<br>Johnson Creek<br>Fish Lake | No additional water available from Johnson or Scotch creeks. | Fish Lake alternative eliminated for cost of pumping to Salmon Lake. | | Johnson Creek is closed; Scotch Creek diversion would impair Johnson Creek water rights. | Inter-basin transfers deplete one basin in favor of another. Fish Lake transfer may affect downstream wildlife area. |
| WS-6: Raise Salmon Lake Dam and Replace Feeder Canal | 330 acre-feet per foot of increase in dam height. This alternative assumes 660 ac-ft of new storage, 990 ac-ft of new dedicated storage, and 200 ac-ft firm yield. Improving feeder canal avoids 36 ac-ft/yr in losses. | $2.1 M for parapet wall and buttress, plus replacing feeder canal with 80 cfs pipe. Annual O&M is part of existing baseline for OID. | Bureau of Reclamation has agreed that it would be feasible to raise the dam. | Amended water storage right and construction permits. | Provides less than 2% of target for instream flows. |
| WS-7: Scotch Basin | 10,000 acre-feet of new storage | | Two dams would be required, together with diversion structures and bypass ditches for Scotch and Coulee creeks. | Change in water right point of diversion, full dam/reservoir permitting. Duck Lake level minima/maxima may constrain operations. | Alternative eliminated for fatal flaws. Basin land owned by Dept Fish & Wildlife and managed for federal candidate species. High scenic quality. Local opposition. |
| WS-8: West Fork Salmon Creek | 500 acre-feet potential firm yield. | | Alternative eliminated because no feasible storage site was identified. | Diversion, storage and dam permits | |